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# A COMPACT TABLE OF BLACKBODY RADIATION FRACTIONS

by

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Technical Note 1

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## A compact table of blackbody radiation fractions

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When dealing with solar or thermal radiation, it is often useful to know the fraction of blackbody radiation contained between two wavelengths, for a given emitter temperature. Tabulations of this quantity as a function of $\lambda T$, the product of wavelength and absolute temperature, are available in the literature. However, in many cases the tables have a fairly large interval in $\lambda T$, requiring frequent interpolation, as for example Dunkle (1954), Allen (1955), and Goody (1964). At the other extreme, the $\lambda T$ interval is very small in the tables of Pivovonsky and Nagel (1961), but such precision is usually unnecessary and the 90 pages of tables of this function make them somewhat unwieldy to use.

Since the blackbody energy fraction is often the only wavelength-dependent radiation quantity needed, it is convenient to have a compact table of this function with sufficiently small intervals of $\lambda T$ that interpolation is not necessary for most applications. A numerical integration of the governing equation was used to generate such tables, with wavelength in microns and temperatures in both degrees Kelvin and degrees Rankine. The tables are available upon request in the form of a technical note from the Center for Climatic Research, University of Winconsin, 1225 W. Dayton St., Madison, Wis. 53706.

### References

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Dunkle, R. V., 1954: Thermal Radiation Tables and Applications. *Trans. Amer. Soc. Mech. Eng.*, 76, 549–552.

Goody, R. M., 1964: *Atmospheric Radiation, Vol. I: The Theoretical Basis.* Oxford, The Clarendon Press.

Pivovonsky, M., and M. R. Nagel, 1961: *Tables of Blackbody Radiation Functions.* New York, The Macmillan Co.

# A Compact Table of Blackbody Radiation Fractions

When dealing with solar or thermal radiation, it is often useful to have an estimate of the fraction of blackbody radiant energy contained between two wavelengths, for a given emitter temperature. The fraction of blackbody radiation contained between wavelengths zero and $\lambda$, for emitter temperature T, is given by the relation

$$f(0 \rightarrow \lambda T) = \frac{15}{\pi^4} \int_x^\infty \frac{X^3 dX}{e^X - 1} , \qquad (1)$$

where $$X = \frac{C_2}{\lambda T} ,$$

and $C_2$ is a constant. Then, the fraction of energy between $\lambda_1$ and $\lambda_2$ is simply the difference of the fractions between 0 and $\lambda_2$ and between 0 and $\lambda_1$.

Tabulations of $f(0 \rightarrow \lambda T)$ as a function of $\lambda T$ are available in the literature. However, in many cases, the tables have a relatively large interval in $\lambda T$, requiring frequent interpolation, as for example, Dunkle (1954), Allen (1955), and Goody (1964). At the other extreme, the $\lambda T$ interval is small but the tables are long and unwieldy, e.g., Pivovonsky and Nagel (1961), who devote 90 pages to the tabulation of $f(0 \rightarrow \lambda T)$, along with two other blackbody radiation functions.

Since the blackbody energy fraction is often the only quantity needed, it is convenient to have a compact table of this function with sufficiently small intervals of $\lambda T$ that interpolation is not necessary for most applications. The tables in this report were generated by a numerical integration of equation (1), using $C_2$ = 14386.8 micron-deg K (Allen, 1955). Agreement with the detailed tables of Pivovonsky and Nagel (1961) is very close, with the small deviation due to the use by them of 14380.0 micron-deg K for $C_2$.

Separate tables are given at the end of this report for temperatures in degrees Kelvin and in degrees Rankine, with wavelength in microns for both cases.

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## References

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## FRACTION OF BLACK-BODY RADIANT ENERGY BETWEEN ZERO AND LAMDA*T

| LAMDA*TEMP (MICRON*K) | PROPORTIONAL PARTS .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 500. | .000000 | .000000 | .000000 | .000000 | .000000 | .000000 | .000000 | .000000 | .000000 | .000000 |
| 600. | .000000 | .000000 | .000000 | .000000 | .000000 | .000000 | .000001 | .000001 | .000001 | .000001 |
| 700. | .000002 | .000002 | .000003 | .000004 | .000005 | .000006 | .000007 | .000009 | .000011 | .000014 |
| 800. | .000016 | .000020 | .000024 | .000028 | .000034 | .000040 | .000047 | .000055 | .000065 | .000075 |
| 900. | .000087 | .000101 | .000116 | .000133 | .000152 | .000174 | .000197 | .000224 | .000253 | .000285 |
| 1000. | .000321 | .000360 | .000403 | .000450 | .000501 | .000556 | .000617 | .000682 | .000753 | .000829 |
| 1100. | .000912 | .001001 | .001096 | .001198 | .001308 | .001425 | .001550 | .001683 | .001825 | .001976 |
| 1200. | .002136 | .002305 | .002485 | .002674 | .002875 | .003086 | .003309 | .003543 | .003789 | .004048 |
| 1300. | .004319 | .004603 | .004900 | .005211 | .005536 | .005875 | .006229 | .006597 | .006981 | .007380 |
| 1400. | .007794 | .008225 | .008671 | .009135 | .009614 | .010111 | .010625 | .011156 | .011705 | .012271 |
| 1500. | .012856 | .013459 | .014080 | .014720 | .015378 | .016055 | .016751 | .017466 | .018201 | .018954 |
| 1600. | .019728 | .020520 | .021333 | .022165 | .023017 | .023888 | .024780 | .025691 | .026623 | .027574 |
| 1700. | .028545 | .029537 | .030548 | .031580 | .032631 | .033702 | .034793 | .035904 | .037035 | .038186 |
| 1800. | .039356 | .040546 | .041756 | .042985 | .044234 | .045501 | .046788 | .048094 | .049419 | .050763 |
| 1900. | .052126 | .053507 | .054907 | .056325 | .057761 | .059215 | .060687 | .062177 | .063684 | .065209 |
| 2000. | .066751 | .068310 | .069886 | .071478 | .073087 | .074713 | .076354 | .078011 | .079685 | .081373 |
| 2100. | .083077 | .084797 | .086531 | .088280 | .090043 | .091821 | .093613 | .095418 | .097238 | .099071 |
| 2200. | .100917 | .102776 | .104648 | .106533 | .108430 | .110339 | .112260 | .114193 | .116138 | .118094 |
| 2300. | .120060 | .122038 | .124026 | .126025 | .128034 | .130053 | .132082 | .134120 | .136168 | .138225 |
| 2400. | .140290 | .142365 | .144448 | .146539 | .148638 | .150746 | .152860 | .154983 | .157112 | .159249 |
| 2500. | .161392 | .163542 | .165699 | .167861 | .170030 | .172205 | .174385 | .176571 | .178762 | .180958 |
| 2600. | .183159 | .185364 | .187575 | .189789 | .192008 | .194230 | .196457 | .198687 | .200920 | .203157 |
| 2700. | .205397 | .207640 | .209886 | .212134 | .214385 | .216638 | .218893 | .221150 | .223409 | .225669 |
| 2800. | .227932 | .230195 | .232460 | .234725 | .236992 | .239260 | .241528 | .243796 | .246065 | .248334 |
| 2900. | .250604 | .252873 | .255142 | .257411 | .259679 | .261947 | .264214 | .266481 | .268746 | .271011 |
| 3000. | .273274 | .275536 | .277797 | .280056 | .282314 | .284570 | .286824 | .289077 | .291327 | .293576 |
| 3100. | .295822 | .298066 | .300307 | .302546 | .304783 | .307017 | .309248 | .311476 | .313702 | .315924 |
| 3200. | .318144 | .320360 | .322573 | .324783 | .326989 | .329192 | .331391 | .333587 | .335779 | .337968 |
| 3300. | .340152 | .342333 | .344510 | .346683 | .348852 | .351016 | .353177 | .355333 | .357485 | .359633 |
| 3400. | .361776 | .363915 | .366049 | .368179 | .370304 | .372425 | .374541 | .376652 | .378758 | .380860 |
| 3500. | .382956 | .385048 | .387135 | .389216 | .391293 | .393365 | .395431 | .397493 | .399549 | .401600 |
| 3600. | .403646 | .405686 | .407722 | .409752 | .411776 | .413795 | .415809 | .417817 | .419820 | .421817 |
| 3700. | .423809 | .425795 | .427776 | .429751 | .431721 | .433685 | .435643 | .437596 | .439543 | .441484 |
| 3800. | .443419 | .445349 | .447273 | .449191 | .451104 | .453011 | .454912 | .456807 | .458696 | .460579 |
| 3900. | .462457 | .464329 | .466195 | .468055 | .469909 | .471757 | .473600 | .475436 | .477267 | .479092 |
| 4000. | .480911 | .482724 | .484531 | .486332 | .488127 | .489916 | .491700 | .493477 | .495248 | .497014 |
| 4100. | .498774 | .500527 | .502275 | .504017 | .505753 | .507483 | .509207 | .510925 | .512637 | .514344 |
| 4200. | .516044 | .517739 | .519427 | .521110 | .522787 | .524458 | .526123 | .527783 | .529436 | .531084 |
| 4300. | .532725 | .534361 | .535991 | .537615 | .539234 | .540846 | .542453 | .544054 | .545650 | .547239 |
| 4400. | .548823 | .550401 | .551973 | .553539 | .555100 | .556655 | .558204 | .559748 | .561286 | .562818 |
| 4500. | .564345 | .565866 | .567381 | .568891 | .570395 | .571894 | .573387 | .574874 | .576356 | .577832 |
| 4600. | .579303 | .580768 | .582228 | .583682 | .585131 | .586574 | .588012 | .589445 | .590872 | .592293 |
| 4700. | .593709 | .595120 | .596526 | .597926 | .599321 | .600710 | .602094 | .603473 | .604847 | .606215 |
| 4800. | .607578 | .608936 | .610288 | .611636 | .612978 | .614315 | .615647 | .616974 | .618296 | .619612 |
| 4900. | .620924 | .622230 | .623531 | .624828 | .626119 | .627405 | .628686 | .629963 | .631234 | .632500 |
| 5000. | .633762 | .635018 | .636270 | .637517 | .638759 | .639996 | .641228 | .642455 | .643678 | .644896 |
| 5100. | .646109 | .647317 | .648521 | .649720 | .650914 | .652103 | .653288 | .654468 | .655644 | .656815 |
| 5200. | .657981 | .659143 | .660300 | .661452 | .662600 | .663744 | .664883 | .666018 | .667148 | .668273 |
| 5300. | .669395 | .670511 | .671624 | .672732 | .673835 | .674935 | .676030 | .677120 | .678207 | .679289 |
| 5400. | .680366 | .681440 | .682509 | .683574 | .684635 | .685692 | .686744 | .687792 | .688837 | .689877 |
| 5500. | .690913 | .691944 | .692972 | .693996 | .695016 | .696031 | .697043 | .698050 | .699054 | .700054 |
| 5600. | .701049 | .702041 | .703029 | .704013 | .704993 | .705969 | .706942 | .707910 | .708875 | .709836 |
| 5700. | .710793 | .711746 | .712695 | .713641 | .714583 | .715521 | .716456 | .717387 | .718314 | .719238 |
| 5800. | .720158 | .721074 | .721987 | .722896 | .723801 | .724703 | .725601 | .726496 | .727388 | .728275 |
| 5900. | .729160 | .730041 | .730918 | .731792 | .732662 | .733529 | .734393 | .735253 | .736110 | .736963 |
| 6000. | .737813 | .738660 | .739504 | .740344 | .741181 | .742014 | .742844 | .743671 | .744495 | .745316 |
| 6100. | .746133 | .746947 | .747758 | .748566 | .749370 | .750172 | .750970 | .751765 | .752557 | .753346 |

## FRACTION OF BLACK-BODY RADIANT ENERGY BETWEEN ZERO AND LAMDA*T

| LAMDA*TEMP (MICRON*K) | PROPORTIONAL PARTS .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 6200. | .754132 | .754915 | .755695 | .756472 | .757245 | .758016 | .758784 | .759548 | .760310 | .761069 |
| 6300. | .761825 | .762577 | .763327 | .764074 | .764818 | .765560 | .766298 | .767033 | .767766 | .768496 |
| 6400. | .769222 | .769947 | .770668 | .771386 | .772102 | .772815 | .773525 | .774233 | .774937 | .775639 |
| 6500. | .776338 | .777035 | .777729 | .778420 | .779109 | .779794 | .780478 | .781158 | .781836 | .782512 |
| 6600. | .783184 | .783855 | .784522 | .785187 | .785850 | .786510 | .787167 | .787822 | .788474 | .789124 |
| 6700. | .789772 | .790417 | .791059 | .791699 | .792337 | .792972 | .793604 | .794235 | .794863 | .795488 |
| 6800. | .796111 | .796732 | .797350 | .797966 | .798580 | .799191 | .799800 | .800407 | .801011 | .801613 |
| 6900. | .802213 | .802811 | .803406 | .803999 | .804590 | .805178 | .805765 | .806349 | .806931 | .807511 |
| 7000. | .808088 | .808663 | .809237 | .809808 | .810377 | .810943 | .811508 | .812070 | .812631 | .813189 |
| 7100. | .813745 | .814299 | .814851 | .815401 | .815949 | .816495 | .817039 | .817581 | .818120 | .818658 |
| 7200. | .819194 | .819728 | .820259 | .820789 | .821317 | .821843 | .822367 | .822889 | .823409 | .823927 |
| 7300. | .824443 | .824957 | .825469 | .825980 | .826488 | .826995 | .827500 | .828003 | .828504 | .829003 |
| 7400. | .829500 | .829996 | .830490 | .830982 | .831472 | .831960 | .832447 | .832931 | .833414 | .833895 |
| 7500. | .834375 | .834852 | .835328 | .835803 | .836275 | .836746 | .837215 | .837682 | .838147 | .838611 |
| 7600. | .839074 | .839534 | .839993 | .840450 | .840906 | .841359 | .841812 | .842262 | .842711 | .843158 |
| 7700. | .843604 | .844048 | .844491 | .844931 | .845371 | .845808 | .846244 | .846679 | .847112 | .847543 |
| 7800. | .847973 | .848402 | .848828 | .849254 | .849677 | .850100 | .850520 | .850939 | .851357 | .851773 |
| 7900. | .852188 | .852601 | .853013 | .853423 | .853832 | .854239 | .854645 | .855050 | .855453 | .855854 |
| 8000. | .856254 | .856653 | .857050 | .857446 | .857841 | .858234 | .858626 | .859016 | .859405 | .859793 |
| 8100. | .860179 | .860564 | .860947 | .861329 | .861710 | .862090 | .862468 | .862844 | .863220 | .863594 |
| 8200. | .863967 | .864338 | .864709 | .865078 | .865445 | .865812 | .866177 | .866541 | .866903 | .867264 |
| 8300. | .867624 | .867983 | .868341 | .868697 | .869052 | .869406 | .869758 | .870110 | .870460 | .870809 |
| 8400. | .871156 | .871503 | .871848 | .872192 | .872535 | .872877 | .873218 | .873557 | .873895 | .874232 |
| 8500. | .874568 | .874903 | .875237 | .875569 | .875900 | .876231 | .876560 | .876888 | .877214 | .877540 |
| 8600. | .877865 | .878188 | .878510 | .878832 | .879152 | .879471 | .879789 | .880106 | .880422 | .880736 |
| 8700. | .881050 | .881363 | .881674 | .881985 | .882294 | .882603 | .882910 | .883216 | .883522 | .883826 |
| 8800. | .884129 | .884431 | .884733 | .885033 | .885332 | .885630 | .885927 | .886224 | .886519 | .886813 |
| 8900. | .887106 | .887398 | .887690 | .887980 | .888269 | .888558 | .888845 | .889131 | .889417 | .889701 |
| 9000. | .889985 | .890268 | .890549 | .890830 | .891110 | .891389 | .891667 | .891944 | .892220 | .892495 |
| 9100. | .892770 | .893043 | .893315 | .893587 | .893858 | .894128 | .894397 | .894665 | .894932 | .895198 |
| 9200. | .895463 | .895728 | .895992 | .896255 | .896516 | .896778 | .897038 | .897297 | .897556 | .897813 |
| 9300. | .898070 | .898326 | .898582 | .898836 | .899089 | .899342 | .899594 | .899845 | .900095 | .900345 |
| 9400. | .900594 | .900841 | .901088 | .901335 | .901580 | .901825 | .902069 | .902312 | .902554 | .902795 |
| 9500. | .903036 | .903276 | .903515 | .903754 | .903991 | .904228 | .904464 | .904700 | .904935 | .905168 |
| 9600. | .905402 | .905634 | .905866 | .906097 | .906327 | .906556 | .906785 | .907013 | .907240 | .907467 |
| 9700. | .907692 | .907918 | .908142 | .908366 | .908589 | .908811 | .909032 | .909253 | .909473 | .909693 |
| 9800. | .909912 | .910130 | .910347 | .910564 | .910780 | .910995 | .911210 | .911424 | .911637 | .911850 |
| 9900. | .912062 | .912273 | .912484 | .912694 | .912903 | .913112 | .913320 | .913527 | .913734 | .913940 |
| 10000. | .914146 | .916166 | .918125 | .920024 | .921867 | .923654 | .925388 | .927071 | .928705 | .930292 |
| 11000. | .931832 | .933328 | .934781 | .936194 | .937566 | .938900 | .940197 | .941458 | .942684 | .943876 |
| 12000. | .945037 | .946166 | .947264 | .948334 | .949375 | .950388 | .951376 | .952337 | .953273 | .954186 |
| 13000. | .955075 | .955942 | .956786 | .957610 | .958412 | .959195 | .959959 | .960704 | .961430 | .962139 |
| 14000. | .962831 | .963507 | .964166 | .964809 | .965438 | .966051 | .966651 | .967236 | .967808 | .968367 |
| 15000. | .968913 | .969446 | .969968 | .970478 | .970976 | .971464 | .971940 | .972406 | .972862 | .973308 |
| 16000. | .973745 | .974172 | .974589 | .974998 | .975398 | .975790 | .976174 | .976549 | .976917 | .977277 |
| 17000. | .977630 | .977975 | .978314 | .978645 | .978970 | .979288 | .979600 | .979906 | .980206 | .980500 |
| 18000. | .980788 | .981070 | .981347 | .981619 | .981885 | .982146 | .982403 | .982654 | .982901 | .983143 |
| 19000. | .983380 | .983613 | .983842 | .984067 | .984287 | .984503 | .984716 | .984924 | .985129 | .985330 |
| 20000. | .985528 | .987322 | .988831 | .990111 | .991202 | .992138 | .992946 | .993647 | .994258 | .994793 |
| 30000. | .995263 | .995678 | .996045 | .996372 | .996664 | .996925 | .997159 | .997370 | .997560 | .997733 |
| 40000. | .997889 | .998031 | .998160 | .998278 | .998386 | .998485 | .998576 | .998660 | .998737 | .998808 |
| 50000. | .998873 | .998935 | .998991 | .999044 | .999093 | .999138 | .999180 | .999220 | .999257 | .999291 |
| 60000. | .999324 | .999354 | .999382 | .999409 | .999434 | .999458 | .999480 | .999501 | .999521 | .999539 |
| 70000. | .999557 | .999574 | .999590 | .999604 | .999619 | .999632 | .999645 | .999657 | .999669 | .999680 |
| 80000. | .999690 | .999700 | .999709 | .999718 | .999727 | .999735 | .999743 | .999751 | .999758 | .999765 |
| 90000. | .999771 | .999777 | .999783 | .999789 | .999795 | .999800 | .999805 | .999810 | .999815 | .999819 |
| 100000. | .999823 | .999827 | .999831 | .999835 | .999839 | .999843 | .999846 | .999849 | .999852 | .999855 |

## FRACTION OF BLACK-BODY RADIANT ENERGY BETWEEN ZERO AND LAMDA*T

| LAMDA*TEMP (MICRON*R) | PROPORTIONAL PARTS .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1100. | .000000 | .000000 | .000000 | .000000 | .000000 | .000000 | .000000 | .000000 | .000000 | .000001 |
| 1200. | .000001 | .000001 | .000001 | .000001 | .000001 | .000001 | .000002 | .000002 | .000002 | .000003 |
| 1300. | .000003 | .000003 | .000004 | .000005 | .000005 | .000006 | .000007 | .000007 | .000008 | .000009 |
| 1400. | .000011 | .000012 | .000013 | .000015 | .000016 | .000018 | .000020 | .000022 | .000025 | .000027 |
| 1500. | .000030 | .000033 | .000036 | .000040 | .000044 | .000048 | .000052 | .000057 | .000062 | .000068 |
| 1600. | .000074 | .000080 | .000087 | .000094 | .000102 | .000111 | .000119 | .000129 | .000139 | .000150 |
| 1700. | .000161 | .000174 | .000186 | .000200 | .000215 | .000230 | .000246 | .000263 | .000282 | .000301 |
| 1800. | .000321 | .000342 | .000364 | .000388 | .000413 | .000439 | .000466 | .000495 | .000525 | .000556 |
| 1900. | .000589 | .000623 | .000660 | .000697 | .000737 | .000778 | .000820 | .000865 | .000912 | .000960 |
| 2000. | .001011 | .001063 | .001118 | .001175 | .001234 | .001295 | .001359 | .001425 | .001493 | .001564 |
| 2100. | .001638 | .001714 | .001792 | .001874 | .001958 | .002045 | .002135 | .002228 | .002324 | .002423 |
| 2200. | .002526 | .002631 | .002740 | .002852 | .002967 | .003086 | .003208 | .003334 | .003463 | .003596 |
| 2300. | .003733 | .003874 | .004018 | .004167 | .004319 | .004475 | .004635 | .004800 | .004968 | .005141 |
| 2400. | .005318 | .005499 | .005685 | .005875 | .006070 | .006269 | .006473 | .006681 | .006894 | .007112 |
| 2500. | .007335 | .007562 | .007794 | .008031 | .008274 | .008521 | .008773 | .009030 | .009292 | .009560 |
| 2600. | .009833 | .010111 | .010394 | .010683 | .010977 | .011276 | .011581 | .011892 | .012208 | .012529 |
| 2700. | .012856 | .013189 | .013527 | .013871 | .014220 | .014576 | .014937 | .015304 | .015676 | .016055 |
| 2800. | .016439 | .016829 | .017226 | .017628 | .018036 | .018450 | .018870 | .019295 | .019727 | .020165 |
| 2900. | .020609 | .021060 | .021516 | .021978 | .022446 | .022921 | .023401 | .023888 | .024381 | .024880 |
| 3000. | .025385 | .025896 | .026414 | .026937 | .027467 | .028003 | .028545 | .029094 | .029648 | .030209 |
| 3100. | .030775 | .031348 | .031928 | .032513 | .033104 | .033702 | .034306 | .034916 | .035532 | .036154 |
| 3200. | .036782 | .037417 | .038057 | .038704 | .039356 | .040015 | .040680 | .041350 | .042027 | .042710 |
| 3300. | .043399 | .044094 | .044794 | .045501 | .046214 | .046932 | .047657 | .048387 | .049123 | .049865 |
| 3400. | .050613 | .051366 | .052126 | .052891 | .053661 | .054438 | .055220 | .056008 | .056801 | .057600 |
| 3500. | .058405 | .059215 | .060030 | .060851 | .061678 | .062510 | .063347 | .064190 | .065038 | .065892 |
| 3600. | .066750 | .067614 | .068484 | .069358 | .070238 | .071123 | .072012 | .072907 | .073807 | .074712 |
| 3700. | .075622 | .076537 | .077457 | .078382 | .079311 | .080246 | .081185 | .082129 | .083077 | .084030 |
| 3800. | .084988 | .085951 | .086918 | .087890 | .088866 | .089846 | .090831 | .091821 | .092814 | .093812 |
| 3900. | .094815 | .095821 | .096832 | .097847 | .098866 | .099889 | .100917 | .101948 | .102983 | .104023 |
| 4000. | .105066 | .106113 | .107164 | .108218 | .109277 | .110339 | .111405 | .112474 | .113547 | .114624 |
| 4100. | .115704 | .116788 | .117875 | .118966 | .120060 | .121157 | .122258 | .123362 | .124469 | .125580 |
| 4200. | .126693 | .127810 | .128930 | .130053 | .131179 | .132308 | .133439 | .134574 | .135712 | .136852 |
| 4300. | .137995 | .139141 | .140290 | .141441 | .142596 | .143752 | .144911 | .146073 | .147238 | .148404 |
| 4400. | .149574 | .150745 | .151919 | .153095 | .154274 | .155455 | .156638 | .157823 | .159011 | .160200 |
| 4500. | .161392 | .162585 | .163781 | .164979 | .166178 | .167380 | .168583 | .169788 | .170995 | .172204 |
| 4600. | .173415 | .174627 | .175841 | .177057 | .178274 | .179493 | .180713 | .181935 | .183158 | .184383 |
| 4700. | .185609 | .186837 | .188066 | .189296 | .190528 | .191760 | .192994 | .194230 | .195466 | .196704 |
| 4800. | .197943 | .199182 | .200423 | .201665 | .202908 | .204152 | .205397 | .206642 | .207889 | .209136 |
| 4900. | .210385 | .211634 | .212883 | .214134 | .215385 | .216637 | .217890 | .219143 | .220397 | .221651 |
| 5000. | .222906 | .224162 | .225418 | .226674 | .227931 | .229188 | .230446 | .231704 | .232962 | .234221 |
| 5100. | .235480 | .236739 | .237999 | .239259 | .240519 | .241779 | .243039 | .244300 | .245560 | .246821 |
| 5200. | .248081 | .249342 | .250603 | .251864 | .253124 | .254385 | .255645 | .256906 | .258166 | .259426 |
| 5300. | .260686 | .261946 | .263206 | .264465 | .265724 | .266983 | .268242 | .269500 | .270758 | .272016 |
| 5400. | .273273 | .274530 | .275786 | .277043 | .278298 | .279553 | .280808 | .282062 | .283316 | .284569 |
| 5500. | .285822 | .287074 | .288325 | .289576 | .290826 | .292076 | .293325 | .294573 | .295821 | .297068 |
| 5600. | .298314 | .299559 | .300804 | .302048 | .303291 | .304533 | .305775 | .307016 | .308255 | .309494 |
| 5700. | .310733 | .311970 | .313206 | .314442 | .315676 | .316910 | .318142 | .319374 | .320605 | .321834 |
| 5800. | .323063 | .324291 | .325517 | .326743 | .327967 | .329191 | .330413 | .331634 | .332854 | .334073 |
| 5900. | .335291 | .336508 | .337723 | .338938 | .340151 | .341363 | .342574 | .343783 | .344992 | .346199 |
| 6000. | .347405 | .348610 | .349813 | .351015 | .352216 | .353415 | .354613 | .355810 | .357006 | .358200 |
| 6100. | .359393 | .360585 | .361775 | .362963 | .364151 | .365337 | .366521 | .367705 | .368886 | .370067 |
| 6200. | .371246 | .372423 | .373599 | .374774 | .375947 | .377119 | .378289 | .379458 | .380625 | .381790 |
| 6300. | .382955 | .384117 | .385278 | .386438 | .387596 | .388753 | .389908 | .391061 | .392213 | .393363 |
| 6400. | .394512 | .395659 | .396804 | .397948 | .399091 | .400232 | .401371 | .402508 | .403644 | .404778 |
| 6500. | .405911 | .407042 | .408171 | .409299 | .410425 | .411550 | .412672 | .413793 | .414913 | .416030 |
| 6600. | .417147 | .418261 | .419374 | .420485 | .421594 | .422701 | .423807 | .424911 | .426014 | .427115 |
| 6700. | .428214 | .429311 | .430406 | .431500 | .432592 | .433683 | .434771 | .435858 | .436943 | .438027 |

## FRACTION OF BLACK-BODY RADIANT ENERGY BETWEEN ZERO AND LAMDA*T

| LAMDA*TEMP (MICRON*R) | PROPORTIONAL PARTS .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 6800. | .439108 | .440188 | .441266 | .442343 | .443417 | .444490 | .445561 | .446630 | .447698 | .448763 |
| 6900. | .449827 | .450889 | .451950 | .453008 | .454065 | .455120 | .456173 | .457225 | .458274 | .459322 |
| 7000. | .460368 | .461412 | .462455 | .463495 | .464534 | .465571 | .466606 | .467640 | .468671 | .469701 |
| 7100. | .470729 | .471755 | .472779 | .473802 | .474823 | .475841 | .476858 | .477874 | .478887 | .479899 |
| 7200. | .480908 | .481916 | .482922 | .483927 | .484929 | .485930 | .486928 | .487925 | .488920 | .489914 |
| 7300. | .490905 | .491895 | .492883 | .493869 | .494853 | .495835 | .496816 | .497794 | .498771 | .499746 |
| 7400. | .500719 | .501691 | .502660 | .503628 | .504594 | .505558 | .506520 | .507480 | .508439 | .509396 |
| 7500. | .510350 | .511303 | .512255 | .513204 | .514152 | .515097 | .516041 | .516984 | .517924 | .518862 |
| 7600. | .519799 | .520734 | .521667 | .522598 | .523528 | .524455 | .525381 | .526305 | .527227 | .528148 |
| 7700. | .529066 | .529983 | .530898 | .531811 | .532722 | .533632 | .534539 | .535445 | .536350 | .537252 |
| 7800. | .538152 | .539051 | .539948 | .540843 | .541737 | .542628 | .543518 | .544406 | .545292 | .546177 |
| 7900. | .547059 | .547940 | .548819 | .549697 | .550572 | .551446 | .552318 | .553188 | .554057 | .554923 |
| 8000. | .555788 | .556652 | .557513 | .558373 | .559231 | .560087 | .560941 | .561794 | .562645 | .563494 |
| 8100. | .564341 | .565187 | .566031 | .566873 | .567714 | .568552 | .569389 | .570225 | .571058 | .571890 |
| 8200. | .572720 | .573548 | .574375 | .575200 | .576023 | .576845 | .577665 | .578483 | .579299 | .580114 |
| 8300. | .580927 | .581738 | .582548 | .583356 | .584162 | .584966 | .585769 | .586570 | .587370 | .588167 |
| 8400. | .588964 | .589758 | .590551 | .591342 | .592131 | .592919 | .593705 | .594490 | .595272 | .596053 |
| 8500. | .596833 | .597611 | .598387 | .599161 | .599934 | .600706 | .601475 | .602243 | .603010 | .603774 |
| 8600. | .604537 | .605299 | .606059 | .606817 | .607573 | .608328 | .609082 | .609834 | .610584 | .611332 |
| 8700. | .612079 | .612825 | .613568 | .614310 | .615051 | .615790 | .616527 | .617263 | .617997 | .618730 |
| 8800. | .619461 | .620191 | .620919 | .621645 | .622370 | .623093 | .623815 | .624535 | .625254 | .625971 |
| 8900. | .626686 | .627400 | .628113 | .628823 | .629533 | .630241 | .630947 | .631652 | .632355 | .633056 |
| 9000. | .633757 | .634455 | .635152 | .635848 | .636542 | .637235 | .637926 | .638616 | .639304 | .639990 |
| 9100. | .640676 | .641359 | .642041 | .642722 | .643401 | .644079 | .644755 | .645430 | .646103 | .646775 |
| 9200. | .647446 | .648115 | .648782 | .649448 | .650113 | .650776 | .651437 | .652098 | .652756 | .653414 |
| 9300. | .654070 | .654724 | .655377 | .656029 | .656679 | .657328 | .657975 | .658621 | .659266 | .659909 |
| 9400. | .660551 | .661191 | .661830 | .662467 | .663103 | .663738 | .664371 | .665003 | .665634 | .666263 |
| 9500. | .666891 | .667517 | .668143 | .668766 | .669389 | .670010 | .670629 | .671247 | .671864 | .672480 |
| 9600. | .673094 | .673707 | .674318 | .674929 | .675537 | .676145 | .676751 | .677356 | .677959 | .678562 |
| 9700. | .679162 | .679762 | .680360 | .680957 | .681553 | .682147 | .682740 | .683332 | .683922 | .684511 |
| 9800. | .685099 | .685685 | .686270 | .686854 | .687437 | .688018 | .688598 | .689177 | .689755 | .690331 |
| 9900. | .690906 | .691480 | .692052 | .692623 | .693193 | .693762 | .694330 | .694896 | .695461 | .696024 |
| 10000. | .696587 | .702145 | .707581 | .712900 | .718102 | .723192 | .728171 | .733042 | .737808 | .742471 |
| 11000. | .747032 | .751496 | .755863 | .760137 | .764318 | .768410 | .772415 | .776335 | .780171 | .783925 |
| 12000. | .787601 | .791198 | .794720 | .798168 | .801544 | .804849 | .808086 | .811255 | .814359 | .817398 |
| 13000. | .820376 | .823292 | .826148 | .828947 | .831688 | .834374 | .837006 | .839585 | .842112 | .844589 |
| 14000. | .847016 | .849395 | .851727 | .854014 | .856255 | .858453 | .860607 | .862720 | .864792 | .866824 |
| 15000. | .868817 | .870772 | .872689 | .874571 | .876416 | .878227 | .880003 | .881746 | .883457 | .885136 |
| 16000. | .886784 | .888401 | .889989 | .891547 | .893077 | .894580 | .896055 | .897503 | .898925 | .900322 |
| 17000. | .901694 | .903041 | .904365 | .905665 | .906943 | .908197 | .909430 | .910642 | .911833 | .913002 |
| 18000. | .914152 | .915282 | .916393 | .917485 | .918558 | .919614 | .920651 | .921671 | .922674 | .923660 |
| 19000. | .924630 | .925584 | .926522 | .927445 | .928353 | .929246 | .930124 | .930988 | .931838 | .932675 |
| 20000. | .933498 | .941047 | .947511 | .953074 | .957886 | .962068 | .965719 | .968920 | .971737 | .974226 |
| 30000. | .976432 | .978396 | .980148 | .981716 | .983124 | .984392 | .985536 | .986571 | .987511 | .988364 |
| 40000. | .989142 | .989852 | .990502 | .991097 | .991644 | .992147 | .992610 | .993037 | .993433 | .993798 |
| 50000. | .994137 | .994452 | .994745 | .995017 | .995271 | .995508 | .995729 | .995936 | .996130 | .996311 |
| 60000. | .996481 | .996641 | .996792 | .996933 | .997066 | .997192 | .997310 | .997422 | .997528 | .997628 |
| 70000. | .997722 | .997812 | .997897 | .997977 | .998054 | .998126 | .998195 | .998261 | .998323 | .998382 |
| 80000. | .998439 | .998493 | .998545 | .998594 | .998641 | .998685 | .998728 | .998769 | .998808 | .998846 |
| 90000. | .998882 | .998916 | .998949 | .998981 | .999011 | .999040 | .999068 | .999095 | .999121 | .999146 |
| 100000. | .999169 | .999192 | .999214 | .999236 | .999256 | .999276 | .999295 | .999313 | .999331 | .999348 |
| 110000. | .999364 | .999380 | .999396 | .999410 | .999425 | .999439 | .999452 | .999465 | .999477 | .999489 |
| 120000. | .999501 | .999512 | .999523 | .999534 | .999544 | .999554 | .999564 | .999573 | .999582 | .999591 |
| 130000. | .999600 | .999608 | .999616 | .999624 | .999632 | .999639 | .999646 | .999653 | .999660 | .999666 |
| 140000. | .999673 | .999679 | .999685 | .999691 | .999697 | .999702 | .999708 | .999713 | .999718 | .999723 |
| 150000. | .999728 | .999733 | .999737 | .999742 | .999746 | .999750 | .999755 | .999759 | .999763 | .999767 |